5. CLOSURE ACTIVITIES

This closure plan describes the methods for closing the VES-SFE-106 tank system per the interim status tank system closure performance standard requirements of IDAPA 58.01.05.009 (40 CFR 265, Subparts G and J). The tank system will be closed by decontamination or removal and disposition of the equipment subject to closure. The following subsections describe closure activities, waste management activities, and required closure documentation to satisfy the tank system closure performance standards (see Section 4).

The tank, ancillary equipment, and piping associated with the VES-SFE-106 tank system are to be closed under HWMA/RCRA by removal of the VES-SFE-106 tank, and decontamination or removal of ancillary equipment and piping. Tank system components undergoing HWMA/RCRA closure will either be decontaminated to the site-specific action levels specified in this HWMA/RCRA closure plan or will be removed and disposed to the extent practicable. Compliance with the performance standards for the VES-SFE-106 tank system units that will be decontaminated will be demonstrated by sampling the final rinsate solutions from the decontamination efforts and comparing the resulting analytical data with the site-specific action levels provided in Table 5-1.

Water will be used for equipment decontamination. Water is the medium through which the hazardous constituents, in the form of sludge solids, were transferred to the units being closed. The decontamination system is designed to provide high-pressure water to the units being decontaminated, thus washing and mobilizing residual hazardous solids remaining within the units.

These action levels were developed to provide specific criteria to demonstrate that the tanks, piping, and ancillary equipment, subsequent to completion of closure activities, are left in a state that is protective of human health and the environment (Orchard 2004). Rinsate sampling will be conducted in accordance with the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Deactivation, Decontamination, and Decommissioning* (DOE-ID 2004b) and *Field Sampling Plan for the HWMA/RCRA Closure Addressing the CPP-648 Radioactive Solid and Liquid Waste Storage Tank System* (ICP 2005).

Table 5-1. Contaminant of concern and corresponding site-specific action levels.

Constituent of Concern	Action Level (mg/L)	Constituent of Concern	Action Level (mg/L)
2-Butanone	1.7E+02	Lead	4.0E+00
4-Methyl-2-pentanone	2.8E+03	Mercury	1.6E-01
Aluminium	9.9E+04	Nickel	2.4E+03
Antimony	4.8E+01	Selenium	7.8E-01
Arsenic	1.6E+00	Silver	4.0E+00
Barium	8.0E+01	Thallium	7.9E+00
Beryllium	1.2E+02	Toluene	5.0E+02
Cadmium	8.0 E-01	Vanadium	8.4E+02
Chromium	3.5E+00	Zinc	3.6E+04

5.1 Removal of Hazardous Waste Inventory

The VES-SFE-106 tank contains a waste heel approximately 24 in. in depth that consists of a flocculent upper layer and a denser lower layer. The tank also contains debris including discarded ventilation ducting, pieces of rope (entwined with internal tank structure), and other miscellaneous materials that are not visible due to the sludge layer.

The VES-SFE-106 tank sludge heel will be removed by mixing or sluicing the heel to fluidize the sludge. Once the sludge has been mixed and fluidized, it will be transferred to containers that are compatible with the waste for treatment and subsequent disposal. To render the fluidized characteristically hazardous sludge nonhazardous, grout will be blended with the fluidized sludge in the container, which will then be placed in a holding area to allow the grout to cure. A representative sample of the stabilized waste will be collected and analyzed for RCRA toxicity characteristic leaching procedure (TCLP) metals in compliance with SW-846 (EPA 2003) protocol. If the solidified grout is determined to be nonhazardous per RCRA, the corresponding container will be transported to the INL Radioactive Waste Management Complex (RWMC) for disposal. If the solidified grout is determined to be RCRA hazardous or fails to meet applicable land disposal restriction (LDR) treatment standards, the corresponding container will be transported to a permitted treatment, storage, and disposal facility (TSDF). Dewatered liquids, if any, will undergo a HWD and be appropriately disposed.

5.2 Removal of Tank and CPP-648

The VES-SFE-106 tank will be removed and managed in accordance with HWMA/RCRA regulations once the residual hazardous waste inventory has been removed. Piping connected to the VES-SFE-106 tank, pumps, and sumps will be cut and removed. The tank will either be removed in one piece or sized into manageable pieces. The tank, sumps, pumps, piping, and CPP-648 structure, including the VES-SFE-106 vault and vault liner, will be removed and managed based on a HWD. Soils present beneath CPP-648 will be sampled and managed in accordance with Subsection 5.4 of this document

5.3 Closure of Ancillary Piping and Equipment

Ancillary piping and equipment associated with the VES-SFE-106 tank system have been organized into three groups based upon location: piping and equipment located within CPP-648, piping and equipment located within CPP-603, and piping that is buried. Ancillary piping and equipment included in each of these three groups are listed in Tables 5-2, 5-3, and 5-4, and are discussed further in the following subsections.

5.3.1 CPP-648 and CPP-603

Unless otherwise specified, accessible piping and equipment located in CPP-648 and CPP-603 will be removed and managed based on a HWD in lieu of decontamination. Removed materials will be sized, as necessary, and placed in approved waste shipping containers for transportation and subsequent disposal. If removal is impractical based on field conditions, components may be decontaminated, as specified in Subsection 5.3.2, rather than removed.

Table 5-2. CPP-648 HWMA/RCRA components to be removed.

Piping and Ancillary Equipment	Start	End
2" PLA-100308	Existing Cap	PLV-SFE-42
2" PLA-100309	VES-SFE-106	1 1/2" PLA-105548
2" PLA-100310	VES-SFE-106	1 1/2" PLA-105548
2" PLA-100311	VES-SFE-106	1 1/2" PLA-105548
2" PLA-100313	CPP-648 Boundary	VES-SFE-106
1" PLA-100319	Vault Sump	2" PLA-100320
2" PLA-100320	Existing Cap	2" PLA-100308
2" PLA-100321	1 1/2" PLA-100397	2" PLA-100320
Manhole	VES-SFE-106	Ground Surface
6" PSA-100333	VES-SFE-106	Ground Surface
6" PSA-100334	VES-SFE-106	Ground Surface
6" PSA-100335	VES-SFE-106	Ground Surface
2" VGA-100336	VES-SFE-106	Ground Surface
4" PLA-100337	12" Encasement (nonhazardous)	Vault Sump
1" PLA-100395	Filter	2" PLA-100396
2" PLA-100396	2" PLA-100320	2" PLA-100313
1 1/2" PLA-100397	2" PLA 100397	1 1/2" PLA 104804
2" PLA-100397	P-SFE-206	1 1/2" PLA-100397
2" PLA-101208	PLV-SFE-50	VES-SFE-106
4" PLA-101208	CPP-648 Boundary	PLV-SFE-50
1 1/2" PLA-104804	Existing Cap	CPP-648 Boundary
1 1/2" PLA-105548	JCT 100309/100310/100311	P-SFE-206
1/2" PLAR-155452	P-SFE-206	1" PLAR-155452
1" PLAR-155452	1/2" PLAR-155452	2" PLA-100313
1" PLAR-155453	1" PLA-100319	1 1/2" PLA-105548
1/2" RWAM-155454	PLV-SFE-151	1 1/2" PLA 105548
3/4" RWAR-155940	Existing Cap	RWV-SFE-159
3/4" RWAR-155956	1 1/2" PLA-100397	3/4" RW-AR-155940
1" HAA-100393	HAV-SFE-69	VES-SFE-106
1" HAA-100394	HAV-SFE-68	VES-SFE-106
1" HAA-100395	HAV-SFE-67	VES-SFE-106
1" SS SPARE-1	Existing Cap	VES-SFE-106
1" SS SPARE-2	Existing Cap	VES-SFE-106
1" SS SPARE-3	Existing Cap	VES-SFE-106
1" SS SPARE-4	Existing Cap	VES-SFE-106
2 1/2" ML	VES-SFE-106	Ground Surface
2 1/2" ML	VES-SFE-106	Ground Surface
2 1/2" ML	VES-SFE-106	Ground Surface
UP-1	1/2" PLAR-155452	PLV-SFE-159
UP-2	1/2" RWAM-155454	PI-SFE-106-2
UP-3	2" PLA-100397	PI-SFE-106

Table 5-2. (continued).

Piping and Ancillary Equipment	Start	End
UP-4	UP-3	PI-SFE-111
UP-5	VES-SFE-106	PI-SFE-107-1
2" SFE-106 overflow	VES-SFE-106	Vault Sump
4" PLA-100338	Embedded in 648 Concrete	Vault Sump
Pump P-SFE-206	CPP-648 Pump Room	
Pump P-SFE-206-1	Vault Sump	
Pump P-SFE-206-2	Vault Sump	

UP = Unlabeled Pipe
UV = Unlabeled Valve
ML = Monitoring Line
IE = Ion Exchange System
JCT =Junction
Boundary = The exterior structural component of the building where the piping exits the building (i.e., floor, wall, etc.)

Table 5-3. CPP-603 HWMA/RCRA components to be removed.

System	Piping and Ancillary Equipment	Start	End
New IE	3" BWA-105562	HCV-11	3" PSA 105584
	3" PSA-105584	JCT 105562/105597	2" PLA 105591
	3" PSA-105585	HCV-13	3" PSA 105584
	2" PSA-105586	VES-SF-131	3" BWA 105584
	2" PSA-105587	HCV-19	3" PSA 105589
	3" PSA-105588	HCV-18	3" PSA 105589
	3" PSA-105589	HCV-20	2" PLA 105591
	2" PLA-105591	JCT 105584/105589	CPP-603 Boundary
	3" BWA-105597	HCV-22	3" PSA 105584
Old IE	2" PLA-100277	VES-SF-101	2" PLA 100313
	2" PSA-100278	V-26	2" PSA-100277
	2" BWA-100280	V-18	2" PSA-100277
	2" BWA-100283	V-13	2" PSA-100277
	2" BWA-100284	V-24	2" PSA-100277
	2" PSA-100285	VES-SF-102	2" PSA-100277
	3/4" PSA-100292	Old IE Sump	2" PLA 100313
	1/2" RWA-113207	Inlet	2" PSA-100285
	1/2" RWA-113208	Inlet	2" PSA-100277
	JET-SF-502		

Table 5-3. (continued).

System	Piping and Ancillary Equipment	Start	End
	3" PLN-101203	UP-9	4" PLA 101208
	1" BWN-101205	Existing Cap	4" PLA 101208
	4" PLA-101208	VES-SF-109	CPP-603 Boundary
Sand Filtration	UP-9	F-SF-113	3" PLN-101203
	UP-10	F-SF-114	3" PLN-101203
	UP-11	F-SF-115	3" PLN-101203
	UP-12	Hose Connection	1 1/2" SWAR-108243
	1 1/2" SWAR-108243	Hose Connection	Floor Drain

UP = Unlabeled Pipe
UV = Unlabeled Valve
ML = Monitoring Line
IE = Ion Exchange System
JCT = Junction
Boundary = The exterior structural component of the building where the piping exits the building (i.e., floor, wall, etc.)

5.3.2 Buried Lines

The lines that transferred wastes between the BWTS and the VES-SFE-106 tank, PEWE, and VES-SFE-126 tank systems are buried lines (Table 5-4). These buried lines, with the exception of line 2" PLA-105591, are secondarily contained in stainless steel encasement piping outside of the associated buildings. There is no evidence of a release from these buried lines; therefore, no specific closure activities will be taken for the secondary containment encasement piping. Due to the inaccessibility of these lines, they will be decontaminated and abandoned in place. An integrity evaluation will be conducted to verify the integrity of the piping prior to decontamination. The line integrity will be evaluated using a pressure decay test or comparable method of integrity determination.

Piping that is to remain in place will be iteratively decontaminated in such a manner that the surfaces that were contacted by HWMA/RCRA-hazardous waste are contacted by the decontamination solution. Successful piping decontamination will be demonstrated by sampling the final rinsate solution and comparing the resulting analytical data with the site-specific action levels (Table 5-1). If the concentrations of COCs detected in the final rinsate liquid indicate that the action levels have not been exceeded, then the piping has been decontaminated sufficiently to achieve closure. Provisions for sampling and analysis of the rinsate under HWMA/RCRA closure are included as Subunit 1 in the FSP (ICP 2005). In the event that line integrity cannot be verified and/or piping cannot be successfully decontaminated, this plan may be amended.

The buried lines in Table 5-4 are grouped into three piping sections. Each piping section includes lines that are connected and will be integrity tested and sampled as individual sections. The three piping sections are: the BWTS section, which includes lines 2" PLA-100183, 2" PLA-100313, and 2" PLA-105591; the PEWE section, which includes lines 2" PLA-104803 and 1 1/2" PLA-104804; and the sand filtration section, which includes lines 4" PLA-101208 and UP-13.

Table 5-4. Buried lines to be decontaminated.

Piping Sections	Piping	Start	End	Volume (gal)
BWTS Section	2" PLA-100183	Existing Cap	2" PLA-100313	7
	2" PLA-100313	Existing Cap	CPP-648 Boundary	9
	2" PLA-105591	CPP-603 Boundary	2" PLA-100313	6
PEWE Section	2" PLA-104803	PLV-SFE-127 and -128	PLV-FE-116	285
	1 1/2" PLA-104804	CPP-648 Boundary	2" PLA-104803	7
Sand Filtration Section	4" PLA-101208	CPP-603 Boundary	CPP-648 Boundary	37
	UP-13	Embedded Floor Drain	4" PLA-101208	1

UP = Unlabeled Pipe
IE = Ion Exchange System
Boundary = The exterior structural component of the building where the piping exits the building (i.e., floor, wall, etc.)

Following decontamination, buried piping will be inspected using direct visual inspection or remote video inspection techniques, as technically practicable, to determine if bulk hazardous waste remains in the piping system following decontamination. Normal scaling associated with liquid waste piping systems and residual staining may be present. Small amounts of residue and particles may also be present within the piping, provided that such residues and/or particles do not exceed 5% of the volume of any 1-ft piping length. Should it be determined, based on the inspection, that bulk hazardous waste has not been removed from the system, more aggressive decontamination methods (e.g., high-pressure wash and steam) may be employed.

5.4 Soils

Soils associated with CPP-648 are included within the boundaries of one of the established FFA/CO sites (Operable Unit 3-13 Group 2, CPP-11, and CPP-88) and will be subject to characterization under HWMA/RCRA closure once removal of the CPP-648 structure is completed. Remedial investigation and/or remedial activities with respect to these soils will be completed under the provisions of the FFA/CO (DOE-ID 1991). Completion of these FFA/CO activities will not be a criterion for closure certification. Provisions for sampling and analysis of these soils under HWMA/RCRA closure are included as Subunit 2 in the FSP (ICP 2005). Soil samples will be collected from beneath CPP-648 following removal of the concrete within the timeframe specified in the schedule identified in Section 6. A summary of the validated analytical data resulting from the sampling specified in the FSP will be included in the PE certification for closure of the INTEC Liquid Radioactive Waste Treatment Subsystem. No further actions with regard to these soils will be required to certify closure of the VES-SFE-106 tank system.

5.5 Waste Management

As required by IDAPA 58.01.05.009 (40 CFR 265.114), contaminated equipment and structures must be disposed or decontaminated in accordance with HWMA/RCRA requirements. Waste generated during closure activities may include nonhazardous industrial waste, nonhazardous radioactive waste, and mixed waste (both radioactive and HWMA/RCRA hazardous). Closure-generated wastes will undergo a HWD in accordance with IDAPA 58.01.05.006 (40 CFR 262.11). Generator requirements of IDAPA 58.01.05.006 (40 CFR 262) will be met (an extension to the 90-day accumulation period is being